

## 6.0 REFERENCES

- Adriano, D. C. 1992. *Biogeochemistry of Trace Metals*. Lewis Publishers, Boca Raton, Florida.
- Ainsworth, C. C., and D. Rai. 1987. *Selected Chemical Characterization of Fossil Fuel Wastes*. EPRI EA-5321, Electric Power Research Institute, Palo Alto, California.
- Allard, B., and J. Rydberg. 1983. "Behavior of Plutonium in Natural Waters." In *Plutonium Chemistry*, W. T. Carnall and G. R. Choppin (eds.), pp 275-295, ACS Symposium Series 216, American Chemical Society, Washington, D.C.
- Allison, J. D., D. S. Brown, and K. J. Novo-Gradac. 1991. *MINTEQA2/PRODEFA2, A Geochemical Assessment Model for Environmental Systems: Version 3.0 User's Manual*. EPA/600/3-91/021, U.S. Environmental Protection Agency, Athens, Georgia.
- Alloway, B. J. 1990. "Cadmium." In *Heavy Metals in Soils*, B. J. Alloway (ed.), pp. 100-121, Blackie & Son, Glasgow, Scotland.
- Ames, L. L., J. E. McGarrah, B. A. Walker, and P. F. Salter. 1982. "Sorption of Uranium and Cesium by Hanford Basalts and Associated Secondary Smectites." *Chemical Geology*, 35:205-225.
- Ames, L. L., and D. Rai. 1978. *Radionuclide Interactions with Soil and Rock Media. Volume 1: Processes Influencing Radionuclide Mobility and Retention, Element Chemistry and Geochemistry, and conclusions and Evaluation*. EPA 520/6-78-007A, prepared for the U.S. Environmental Protection Agency by the Pacific Northwest Laboratory, Richland, Washington.
- Artiola, J., and W. H. Fuller. 1979. "Effect of Crushed Limestone Barriers on Chromium Attenuation in Soils." *Journal of Environmental Quality*, 8:503-510.
- Aston, S. R. 1980. "Evaluation of Chemical Forms of Plutonium in Seawater." *Marine Chemistry*, 8:317-326.
- Ault, M. R. 1989. "Gamma Emitting Isotopes of Medical Origin Detected in Sanitary Waste Samples." *Radiation Protection Management*, 6:48-52.
- Azizian, M. F., and P. O. Nelson. 1998. "Lead Sorption, Chemically Enhanced Desorption, and Equilibrium Modeling in an Iron-Oxide-Coated Sand and Synthetic Groundwater System." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 166-180, Academic Press, San Diego, California.
- Baes, C. F., Jr., and R. E. Mesmer. 1976. *The Hydrolysis of Cations*. John Wiley and Sons, New York, New York.

- Baes, C. F., III, and R. D. Sharp. 1981. "Predicting Radionuclide Leaching from Root Zone Soil for Assessment Applications." *Transactions of the American Nuclear Society*, 38:111-112.
- Baes, C. F., and R. D. Sharp. 1983. "A Proposal for Estimation of Soil Leaching Constants for Use in Assessment Models." *Journal of Environmental Quality*, 12:17-28.
- Balistrieri, L. S., and J. W. Murray. 1982. "The Adsorption of Cu, Pb, Zn, and Cd on Goethite from Major Ion Seawater." *Geochimica et Cosmochimica Acta*, 46:1253-1265.
- Ball, J. W., and D. K. Nordstrom. 1998. "Critical Evaluation and Selection of Standard State Thermodynamic Properties for Chromium Metal and Its Aqueous Ions, Hydrolysis Species, Oxides, and Hydroxides." *Journal of Chemical and Engineering Data*, 43:895-918.
- Barney, G. S. 1984. "Radionuclide Sorption and Desorption Reactions with Interbed Materials from the Columbia River Basalt Formation." In *Geochemical Behavior of Radioactive Waste*, G. S. Barney, J. D. Navratil, and W. W. Schulz (eds.), pp. 1-23. American Chemical Society, Washington, D.C.
- Bartlett, R. J., and B. James. 1979. "Behavior of Chromium in Soils. III. Oxidation." *Journal of Environmental Quality*, 8:31-35.
- Bartlett, R. J., and J. M. Kimble. 1976. "Behavior of Chromium in Soils. I. Trivalent Forms." *Journal of Environmental Quality*, 5:379-383.
- Bates, R. L., and J. A. Jackson (eds.). 1980. *Glossary of Geology*. American Geological Institute, Second Edition, Falls Church, Virginia.
- Belle, J., and R. M. Berman. 1984. "Application of Thorium Dioxide in Nuclear Power Reactors." In *Thorium Dioxide: Properties and Nuclear Applications*. J. Belle and R. M. Berman (eds.), pp. 1-22, DOE/NE-0060, U.S. Department of Energy, Washington, D.C.
- Benjamin, M. M., and J. O. Leckie. 1980. "Adsorption of Metals at Oxide Interfaces: Effects on the Concentration of Adsorbate and Competing Metals." In *Contaminants and Sediments, Volume 2*, R. A. Baker (ed.), pp. 305-332, Ann Arbor Science, Ann Arbor, Michigan.
- Benjamin, M. M., and J. O. Leckie. 1981. "Multiple-Site Adsorption of Cd, Cu, Zn, and Pb on Amorphous Iron Oxyhydroxide." *Journal of Colloid and Interface Science*, 79:209-221.
- Bensen, D. W. 1960. *Review of Soil Chemistry Research at Hanford*. HW-67201. General Electric Company, Richland, Washington.

- Billon, A. 1982. "Fixation D'elements Transuraniens a Différents Degres D'oxydation Sur Les Argiles." In *Migration in the Terrestrial Environment of Long-lived Radionuclides from the Nuclear Fuel Cycle*, pp. 167-176, IAEA-SM-257/32. International Atomic Energy Agency, Vienna, Austria.
- Bittel, J. R., and R. J. Miller. 1974. "Lead, Cadmium, and Calcium Selectivity Coefficients on Montmorillonite, Illite, and Kaolinite." *Journal of Environmental Quality*, 3:250-253.
- Blowes, D. W., and C. J. Ptacek. 1992. "Geochemical Remediation of Groundwater by Permeable Reactive Walls: Removal of Chromate by Reaction with Iron-Bearing Solids." In *Proceeding of the Subsurface Restoration Conference, June 21-24, 1992, Dallas, Texas*, pp. 214-216, Rice University Press, Houston, Texas.
- Boggess, W. R., and B. G. Wixson. 1977. *Lead in the Environment*. NSF/RA-770214, National Science Foundation, Washington, D.C.
- Boggs, S., Jr., D. Livermore, and M. G. Seitz. 1985. *Humic Substances in Natural Waters and Their Complexation with Trace Metals and Radionuclides: A Review*. ANL-84-78, Argonne National Laboratory, Argonne, Illinois.
- Bondietti, E. A., S. A. Reynolds and M. H. Shanks. 1975. "Interaction of Plutonium with Complexing Substances in Soils and Natural Waters." In *Transuranium Nuclides in the Environment*, pp. 273-287, IAEA-SM-199/51. International Atomic Energy Agency, Vienna, Austria.
- Bondietti, E. A., and J. R. Trabalka. 1980. "Evidence for Plutonium(V) in an Alkaline, Freshwater Pond." *Radioanalytical Letters*, 43:169-176.
- Borovec, Z. 1981. "The Adsorption of Uranyl Species by Fine Clay." *Chemical Geology*, 32:45-58.
- Borovec, Z., B. Kribek, and V. Tolar. 1979. "Sorption of Uranyl by Humic Acids." *Chemical Geology*, 27:39-46.
- Bovard, P., A. Grauby, and A. Saas. 1970. "Chelating Effect of Organic Matter and its Influence on the Migration of Fission Products." In *Proceedings of Symposium: Isotopes and Radiation in Soil Organic Matter Studies*, pp. 471-495, STI/PUB-190, NSA 24:5659-5668, International Atomic Energy Agency (IAEA), 1968, CONF 680725, Vienna, Austria.
- Bowen, H. J. M. 1979. *Environmental Chemistry of the Elements*. Academic Press, London, England.

- Brady, P. V., R. T. Cygan, and K. L. Nagy. 1998. "Surface Charge and Metal Sorption to Kaolinite." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 371-382, Academic Press, San Diego, California.
- Brady, P. V., B. P. Spalding, K. M. Krupka, R. D. Waters, P. Zhang, D. J. Borns, and W. D. Brady. 1999. *Site Screening and Technical Guidance for Monitored Natural Attenuation at DOE Sites*. SAND99-0464, Sandia National Laboratories, Albuquerque, New Mexico.
- Braids, O. C., F. J. Drone, R. Gadde, H. A. Laitenen, and J. E. Bittel. 1972. Movement of Lead in Soil-Water System. In *Environmental Pollution of Lead and Other Metals*. pp 164-238, University of Illinois, Urbana, Illinois.
- Bruggenwert, M. G. M., and A. Kamphorst. 1979. "Survey of Experimental Information on Cation Exchange in Soil Systems." In *Soil Chemistry: B. Physico-Chemical Models*, G. H. Bolt (ed.), Elsevier Scientific Publishing Company, New York, New York.
- Bruno, J., I. Casas, and I. Puigdomenech. 1988. "The Kinetics of Dissolution of  $\text{UO}_2$  (s) Under Reducing Conditions." *Radiochimica Acta*, 11:44-45.
- Bruno, J., I. Casas, and I. Puigdomenech. 1991. "The Kinetics of Dissolution of  $\text{UO}_2$  Under Reducing Conditions and the Influence of an Oxidized Surface Layer ( $\text{UO}_{2+x}$ ): Application of a Continuous Flow-through Reactor." *Geochimica et Cosmochimica Acta*, 55:647-658.
- Bunzl, K., H. Flessa, W. Kracke, and W. Schimmack. 1995. "Association of Fallout  $^{239+240}\text{Pu}$  and  $^{241}\text{Am}$  with Various Soil Components in Successive Layers of a Grassland Soil." *Environmental Science and Technology*, 29:2513-2518.
- Cavallaro, N., and M. B. McBride. 1978. "Copper and Cadmium Adsorption Characteristics of Selected Acid and Calcareous Soils." *Soil Science Society of America Journal*, 42:550-556.
- Cerling, T. E., and B. P. Spalding. 1982. "Distribution and Relationship of Radionuclides to Streambed Gravels in a Small Watershed." *Environmental Geology*, 4:99-116.
- Charyulu, M. M., I. C. Pius, A. Kadam, M. Ray, C. K. Sivaramakrishnan, and S. K. Patil. 1991. "The Behavior of Plutonium in Aqueous Basic Media." *Journal of Radioanalytical and Nuclear Chemistry*, 152: 479-485.
- Chen, C-C., C. Papelis, and K. F. Hayes. 1998. "Extended X-ray Absorption Fine Structure (EXAFS) Analysis of Aqueous  $\text{Sr}^{II}$  Ion Sorption at Clay-Water Interfaces." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 333-348, Academic Press, San Diego, California.

- Chisholm-Brause, C., S. D. Conradson, C. T. Buscher, P. G. Eller, and D. E. Morris. 1994. "Speciation of Uranyl Sorbed at Multiple Binding Sites on Montmorillonite." *Geochimica et Cosmochimica Acta*, 58:3625-2631.
- Choppin, G. R. 1983. "Aspects of Plutonium Solution Chemistry." In *Plutonium Chemistry*, W. T. Carnall and G. R. Choppin (eds.), pp. 213-230, ACS Symposium Series 216, American Chemical Society, Washington, D.C.
- Choppin, G. R., and J. W. Morse. 1987. "Laboratory Studies of Actinides in Marine Systems." In *Environmental Research on Actinide Elements*, J. E. Pinder, J. J. Alberts, K. W. McLeod, and R. Gene Schreckhise (eds.), pp. 49-72, CONF-841142, Office of Scientific and Technical Information, U.S. Department of Energy, Washington, D.C.
- Chow, T. J. 1978. "Lead in Natural Waters." In *The Biogeochemistry of Lead in the Environment. Part A. Ecological Cycles.*, J. O. Nriagu (ed.), pp. 185-218, Elsevier/North Holland, New York, New York.
- Cleveland, J. M. 1979. *The Chemistry of Plutonium*. American Nuclear Society, LaGrange Park, Illinois.
- Coleman, N. T., R. J. Lewis, and D. Craig. 1963. "Sorption of Cesium by Soils and its Displacement by Salt Solutions." *Soil Science Society of America Proceedings*, 22:390-294.
- Cotton, F. A., and G. Wilkinson. 1980. *Advanced Inorganic Chemistry. A Comprehensive Text*. John Wiley and Sons, New York, New York.
- Coughtrey, P. J., D. Jackson and M. C. Thorne. 1985. *Radionuclide Distribution and Transport in Terrestrial and Aquatic Ecosystems. A Compendium of Data*. A. A. Balkema, Netherlands.
- Cygan, R. T., K. L. Nagy, and P. V. Brady. 1998. "Molecular Models of Cesium Sorption on Kaolinite." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 383-399, Academic Press, San Diego, California.
- Davis, J. A., and J. O. Leckie. 1978 "Surface Ionization and Complexation at the Oxide/Water Interface. II. Surface Properties of Amorphous Iron Oxyhydroxide and Adsorption of Metal Ions." *Journal of Colloid and Interface Science*, 67:90-107.
- Davis, J. A., and J. O. Leckie. 1980. "Surface Ionization and Complexation at the Oxide/Water Interface. 3. Adsorption of Anions." *Journal of Colloid Interface Science*, 74:32-43.
- Deer, W. A., R. A. Howie, and J. Zussman. 1967. *Rock-Forming Minerals. Volume 1. Ortho- and Ring Silicates*. Longmans, London, England.

- Delegard, C. H. 1987. "Solubility of  $\text{PuO}_2 \cdot x\text{H}_2\text{O}$  in Alkaline Hanford High-Level Waste Solution." *Radiochimica Acta*, 41:11-21.
- Delegard, C. H., G. S. Barney, and S. A. Gallagher. 1984. "Effects of Hanford High-Level Waste Components on the Solubility and Sorption of Cobalt, Strontium, Neptunium, Plutonium, and Americium." In *Geochemical Behavior of Disposed Radioactive Waste*, G. S. Barney, J. D. Navratil, and W. W. Schulz (eds.), ACS Symposium Series 246, pp. 95-112. American Chemical Society, Washington, D.C.
- Douglas, L. A. 1989. "Vermiculites." In *Minerals in Soil Environments*, J. B. Dixon and S. B. Week (eds.), Second Edition, pp. 635-674, Soil Science Society of America, Madison, Wisconsin.
- Driesens, F. C. M. 1986. "Ionic Solid Solutions in Contact with Aqueous Solutions." In *Geochemical Processes at Mineral Surfaces*, J. A. Davis and K. F. Hayes (eds.), pp. 524-560, ACS Symposium Series 323. American Chemical Society, Washington, D.C.
- Duff, M. C., and C. Amrhein. 1996. "Uranium(VI) Adsorption on Goethite and Soil in Carbonate Solutions." *Soil Science Society of America Journal*, 60(5):1393-1400.
- Duff, M. C., D. B. Hunter, I. R. Triay, P. M. Bertsch, D. T. Reed, S. R. Sutton, G. Shea-McCarthy, J. Kitten, P. Eng, S. J. Chipera, and D. T. Vaniman. 1999. "Mineral Associations and Average Oxidation States of Sorbed Pu on Tuff." *Environmental Science and Technology*, 32:2163-2169.
- Duram, W. H., J. D. Hem, and S. G. Heidel. 1971. *Reconnaissance of Selected Minor Elements in Surface Waters of the United States, October 1970*. U.S. Geological Survey Circular 643, U.S. Geological Survey, Alexandria, Virginia.
- Eary, L. E., and D. Rai. 1987. "Kinetics of Chromium(III) Oxidation to Chromium(VI) by Reaction with Manganese Dioxide." *Environmental Science and Technology*, 21:1187-1193.
- Eary, L. E., and D. Rai. 1989. "Kinetics of Chromate Reduction by Ferrous Ions Derived from Hematite and Biotite at 25°C." *American Journal of Science*, 289:180-213.
- EPA (U.S. Environmental Protection Agency). 1992. *Background Document for Finite Source Methodology for Wastes Containing Metal*. HWEP-S0040, U.S. Environmental Protection Agency, Office of Solid Waste, Washington, D.C.
- EPA (U.S. Environmental Protection Agency). 1996. *Soil Screening Guidance: Technical Background Document*. EPA/540/R-96/018, U.S. Environmental Protection Agency, Washington, D.C.

EPA/DOE/NRC (Cooperative Effort by the U.S. Environmental Protection Agency, U.S. Department of Energy, and U.S. Nuclear Regulatory Commission). 1993. *Environmental Characteristics of EPA, NRC, and DOE Sites Contaminated with Radioactive Substances*. EPA 402-R-93-011, U.S. Environmental Protection Agency, Washington, D.C.

Evans, E. J. 1956. *Plutonium Retention in Chalk River Soil*. CRHP-660, Chalk River Laboratory, Chalk River, Canada.

Falck, W. E. 1991. *CHEMVAL Project. Critical Evaluation of the CHEMVAL Thermodynamic Database with Respect to its Contents and Relevance to Radioactive Waste Disposal at Sellafield and Dounreay*. DoE/HMIP/RR/92.064, Department of Environment, Her Majesty's Stationery Office, London, England.

Faure, G., and J. L. Powell. 1972. *Strontium Isotope Geology*. Springer-Verlag, Berlin, Germany.

Felmy, A. R., D. Rai, and M. J. Mason. 1991. "The Solubility of Hydrous Thorium(IV) Oxide in Chloride Media: Development of an Aqueous Ion-Interaction Model." *Radiochimica Acta*, 55:177-185.

Felmy, A. R., D. Rai, and D. A. Moore. 1993. "The Solubility of (Ba,Sr)SO<sub>4</sub> Precipitates: Thermodynamic Equilibrium and Reaction Path Analysis." *Geochimica et Cosmochimica Acta*, 57:4345-4363.

Fisher, N. S., S. W. Fowler, F. Boisson, J. Carroll, K. Rissanen, B. Salbu, T. G. Sazykina, and K-L.-Sjoebom. 1999. "Radionuclide Bioconcentrations of Factors and Sediment Partition Coefficients in Arctic Sea Subject to Contamination from Dumped Nuclear Wastes." *Environmental Science and Technology*, 32:1979-1982.

Forbes, E. A., A. M. Posner, and J. P. Quirk. 1976. "The Specific Adsorption of Divalent Cd, Co, Cu, Pb, and Zn on Goethite." *Journal of Soil Science*, 27:154-166.

Freeze, R. A., and J. A. Cherry. 1979. *Groundwater*. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Frondel, C. 1958. *Systematic Mineralogy of Uranium and Thorium*. Geological Survey Bulletin 1064, U.S. Geological Survey, Washington, D.C.

Gadde, R. R., and H. A. Laitinen. 1974. "Study of the Sorption of Lead by Hydrous Ferric Oxide." *Environmental Letters*, 5:223-235.

- Gambrell, R. P., R. A. Khalid, M. B. Verloo, and W. H Patrick, Jr. 1977. *Transformations of Heavy Metals and Plant Nutrients in Dredged Sediments as Affected by Oxidation-Reduction Potential and pH. Volume II: Materials and Methods, Results and Discussion*, Contract Rep. D-77-4, CE, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.
- Gascoyne, M. 1982. "Geochemistry of the Actinides and Their Daughters." In *Uranium Series Disequilibrium: Applications to Environmental Problems*, M. Ivanovich and R. S. Harmon (eds.), pp. 33-55, Clarendon Press, Oxford, England.
- Gerritse, R. G., R. Vriesema, J. W. Dalenberg, and H. P. De Roos. 1982. "Effect of Sewage Sludge on Trace Element Mobility in Soils." *Journal of Environmental Quality*. 11:359-364.
- Gesell, T. F., and W. M. Lowder (eds.). 1980. *Natural Radiation Environment III. Volumes 1 and 2. Proceedings of Symposium Held at Houston, Texas, April 23-28. 1978*. U.S. Department of Energy CONF 780422, National Technical Information Service, Springfield, Virginia.
- Giesy, J. G., Jr. 1980. "Cadmium Interactions with Naturally Occurring Organic Ligands." In *Cadmium in the Environment - Part I Ecological Cycling*, J. O. Nriagu (ed.), pp. 237-256, John Wiley and Sons, New York, New York.
- Giesy, J. P., G. J. Leversee, and D. R. Williams. 1977. "Effects of Natural Occurring Aquatic Organic Fractions on Cadmium Toxicity to *Simocephalus Serrulatus* (Daphnidae) and *Gambusia Affinis* (Poeciliidae)." *Water Research*, 12:1013-1020.
- Glover, P. A., F. J. Miner and W. O. Polzer. 1976. "Plutonium and Americium Behavior in the Soil/Water Environment. I. Sorption of Plutonium and Americium by Soils." In *Proceedings of Actinide-Sediment Reactions Working Meeting, Seattle, Washington*, pp. 225-254, BNWL-2117, Battelle Pacific Northwest Laboratories, Richland, Washington.
- Goldschmidt, V. M. 1954. *Geochemistry*. Clarendon Press, Oxford, England.
- Grasselly, G., and M. Hetenyi. 1971. "The Role of Manganese Minerals in the Migration of Elements." *Society of Mining Geology of Japan*, Special Issue 3:474-477.
- Graves, B. (ed.). 1987. *Radon, Radium, and Other Radioactivity in Ground Water. Hydrogeologic Impact and Application to Indoor Airborne Contamination. Proceedings of the NWWA Association Conference, April 7-9, 1987, Somerset, New Jersey*. Lewis Publishers, Chelsea, Michigan.
- Griffin, R. A., A. K. Au, and R. R. Frost. 1977. "Effect of pH on Adsorption of Chromium from Landfill-Leachate by Clay Minerals." *Journal of Environmental Science Health*, 12:431-449.

- Griffin, R. A., and N. F. Shimp. 1976. "Effect of pH on Exchange-Adsorption or Precipitation of Lead from Landfill Leachates by Clay Minerals." *Environmental Science and Technology*, 10:1256-1261.
- Haji-Djafari, S., P. E. Antommaria, and H. L. Crouse. 1981. "Attenuation of Radionuclides and Toxic Elements by In Situ Soils at a Uranium Tailings Pond in central Wyoming." In *Permeability and Groundwater Contaminant Transport*, T. F. Zimmie and C. O. Riggs (eds.), pp 221-242. ASTM STP 746, American Society of Testing Materials, Washington, D.C.
- Hammond, P. B. 1977. "Human Health Implications." In *Lead in the Environment*, W. R. Bogges and B. G. Wixson (eds.), pp. 195-198, NSF/RA-770214, National Science Foundation, Washington, D.C.
- Hassett, J. J. 1974. "Capacity of Selected Illinois Soils to Remove Lead from Aqueous Solution." *Communications in Soil Science and Plant Analysis*, 5:499-505.
- Hem, J. C. 1977. "Reactions of Metal Ions at Surfaces of Hydrous Iron Oxide." *Geochimica et Cosmochimica Acta*, 41:527-538.
- Hem, J. D. 1972. "Chemistry and Occurrence of Cadmium and Zinc in Surface Water and Ground Water." *Water Resources and Research*, 8:661-679.
- Hem, J. D. 1985. *Study and Interpretation of the Chemical Characteristics of Natural Water*. U.S. Geological Survey Water Supply Paper 2254, U.S. Geological Survey, Alexandria, Virginia.
- Hildebrand, E. E., and W. E. Blum. 1974. "Lead Fixation by Clay Minerals." *Naturewissenschaften*, 61:169-170.
- Hsi, C-K. D., and D. Langmuir. 1985. "Adsorption of Uranyl onto Ferric Oxyhydroxides: Application of the Surface Complexation Site-binding Model." *Geochimica et Cosmochimica Acta*, 49:1931-1941.
- Huang, C. P., H. Z. Elliott, and R. M. Ashmead. 1977. "Interfacial Reactions and the Fate of Heavy Metals in Soil-Water Systems." *Journal of Water Pollution Control Federation*, 49:745-755.
- Hunter, K. A., D. J. Hawke, and L. K. Choo. 1988. "Equilibrium Adsorption of Thorium by Metal Oxides in Marine Electrolytes." *Geochimica et Cosmochimica Acta*, 52:627-636.

IAEA (International Atomic Energy Agency). 1979. *Behavior of Tritium in the Environment (Proceedings of the International Symposium on the Behavior of Tritium in the Environment Jointly Organized by the International Atomic Energy Agency and the OECD Nuclear Energy Agency and Held in San Francisco, 16-20 October 1978)*. Proceedings Series, International Atomic Energy Agency, Vienna, Austria.

Idiz, E. F., D. Carlisle, and I. R. Kaplan. 1986. "Interaction Between Organic Matter and Trace Metals in a Uranium Rich Bog, Kern County, California, U.S.A." *Applied Geochemistry*, 1:573-590.

Izrael, Y. A., and F. Y. Rovinskii. 1970. *Hydrological Uses of Isotopes Produced in Underground Nuclear Explosions for Peaceful Purposes*. UCRL-Trans-10458, International Atomic Energy Agency (IAEA), Vienna.

Jackson, A. P., and B. J. Alloway. 1992. "Transfer of Cadmium from Soils to the Human Food Chain." In *Biogeochemistry of Trace Metals*, D. C. Adriano (ed.), pp.-109-147, Lewis Publishers, Boca Raton, Florida.

Jenne, E. A., J. W. Ball, J. M. Burchard, D. V. Vivit, and J. H. Barks. 1980. "Geochemical Modeling; Apparent Solubility Controls on Ba, Zn, Cd, Pb, and F in Waters of the Missouri Tri-State Mining Area." *Trace Substances in Environmental Health*, 14:353-361.

John, M. K. 1971. "Influence of Soil Characteristics of Adsorption and Desorption of Cadmium." *Environmental Letters*, 2:173-179.

Juo, A. S. R., and S. A Barber. 1970. "The Retention of Strontium by Soils as Influenced by pH, Organic Matter and Saturated Cations." *Soil Science*, 109:143-148.

Juste, C., and M. Mench. 1992. "Long-term Application of Sewage Sludge and Its Effect on Metal Uptake by Crops." In *Biogeochemistry of Trace Metals*, D. C. Adriano (ed.), pp. 159-194, Lewis Publishers, Boca Raton, Florida.

Kaplan, D. I., T. L. Gervais, and K. M. Krupka. 1998. "Uranium(VI) Sorption to Sediments Under High pH and Ionic Strength Conditions." *Radiochimica Acta*, 80:201-211.

Kaplan, D. I., R. J. Serne, A. T. Owen, J. Conca, T. W. Wietsma, and T. L. Gervais. 1996. *Radionuclide Adsorption Distribution Coefficient Measured in Hanford Sediments for the Low Level Waste Performance Assessment Project*. PNNL-11385, Pacific Northwest National Laboratory, Richland, Washington.

Kargbo, D. M., D. S. Fanning, H. I. Inyang, and R. W. Duell. 1993. "Environmental Significance of Acid Sulfate "Clays" as Waste Covers." *Environmental Geology*, 22:218-226.

- Keeney-Kennicutt, W. L., and J. W. Morse. 1985. "The Redox Chemistry of Pu(V)O<sub>2</sub><sup>+</sup> Interaction with Common Mineral Surfaces in Dilute Solutions and Seawater." *Geochimica Cosmochimica Acta*, 49:2577-2588.
- Kent, D. B., V. S. Tripathi, N. B. Ball, J. O. Leckie, and M. D. Siegel. 1988. *Surface-Complexation Modeling of Radionuclide Adsorption in Subsurface Environments*. NUREG/CR-4807, U.S. Nuclear Regulatory Commission, Washington, D.C.
- Khalid, R. A. 1980. "Chemical Mobility of Cadmium in Sediment-Water Systems." In *Cadmium in the Environment - Part 1. Ecological Cycling*. J. O. Nriagu (ed.), pp. 257-298, John Wiley and Sons, New York, New York.
- Kharkar, D. P., K. K. Turekian, and K. K. Bertine. 1968. "Stream Supply of Dissolved Silver, Molybdenum, Antimony, Selenium, Chromium, Cobalt, Rubidium, and Cesium to the Oceans." *Geochimica et Cosmochimica Acta*, 32:285-298.
- Kim, J. J. 1986. "Chemical Behavior of Transuranic Elements in Aquatic Systems." In *Handbook on the Physics and Chemistry of the Actinides*, A. J. Freeman and C. Keller (eds.), pp. 413-455, Elsevier Science Publishers, Amsterdam, Holland.
- Kokotov, Y. A., and R. F. Popova. 1962. "Sorption of Long-Lived Fission Products by Soils and Argillaceous Minerals III: Selectivity of Soils and Clays Toward <sup>90</sup>Sr Under Various Conditions." *Soviet Radiochemistry*, 4:292-297.
- Korte, N. E., J. Skopp, W. H. Fuller, E. E. Niebla, and B. A. Alesii. 1976. "Trace Element Movement in Soils: Influence of Soil Physical and Chemical Properties." *Soil Science Journal*, 122:350-359.
- Krupka, K. M. and R. J. Serne. 1998. *Effects on Radionuclide Concentrations by Cement/Ground-Water Interactions to Support Performance Assessment of Low-Level Radioactive Waste Disposal Facilities*. NUREG/CR-6377, Pacific Northwest National Laboratory, Richland, Washington.
- LaFlamme, B. D., and J. W. Murray. 1987. "Solid/Solution Interaction: The Effect of Carbonate Alkalinity on Adsorbed Thorium." *Geochimica et Cosmochimica Acta*, 51:243-250.
- Lagerwerff, J. V., and D. L. Brower. 1973. "Exchange Adsorption or Precipitation of Lead in Soils Treated With Chlorides of Aluminum, Calcium and Sodium." *Soil Science Society of America Proceedings*, 27:1951-1954.
- Landa, E. R., A. H. Le, R. L. Luck, and P. J. Yeich. 1995. "Sorption and Coprecipitation of Trace Concentrations of Thorium with Various Minerals Under Conditions Simulating an Acid Uranium Mill Effluent Environment." *Inorganica Chimica Acta*, 229:247-252.

- Langmuir, D. 1978. "Uranium Solution-mineral Equilibria at Low Temperatures with Applications to Sedimentary Ore Deposits." *Geochimica et Cosmochimica Acta*, 42:547-569.
- Langmuir, D., and J. S. Herman. 1980. "The Mobility of Thorium in Natural Waters at Low Temperatures." *Geochimica et Cosmochimica Acta*, 44:1753-1766.
- Leckie, J. O., M. M. Benjamin, K. Hayes, G. Kaufman, and S. Altman. 1980. *Adsorption/Coprecipitation of Trace Elements from Water With Iron Oxyhydroxides*. EPRI-RP-910, Electric Power Research Institute, Palo Alto, California.
- Lefevre, R., M. Sardin, and D. Schweich. 1993. "Migration of Strontium in Clayey and Calcareous Sandy Soil: Precipitation and Ion Exchange." *Journal of Contaminant Hydrology*, 13:215-229.
- Lemire, R. J., and P. R. Tremaine. 1980. "Uranium and Plutonium Equilibria in Aqueous Solutions to 200°C." *Journal of Chemical Engineering Data*, 25:361-370.
- Levi-Minzi, R., G. F. Soldatini, and R. Riffaldi. 1976. "Cadmium Adsorption by Soils." *Journal of Soil Science*, 27:10-15.
- Levy, R., and C. W. Francis. 1976. "Adsorption and Desorption of Cadmium by Synthetic and Natural Organo-Clay Complexes." *Geoderma*, 18:193-205.
- Lindenmeier, C. W., R. J. Serne, J. L. Conca, A. T. Owen, and M. I. Wood. 1995. *Solid Waste Leach Characteristics and Contaminant-Sediment Interactions Volume 2: Contaminant Transport Under Unsaturated Moisture Contents*. PNL-10722, Pacific Northwest Laboratory, Richland, Washington.
- Lindsay, W. L. 1979. *Chemical Equilibria in Soils*. J. Wiley and Sons, New York, New York.
- MacNaughton, M. G. 1977. "Adsorption of Chromium(VI) at the Oxide-Water Interface." In *Biological Implications of Metals in the Environment*, H. Drucker and R. F. Wildung (eds.), pp. 244-253, CONF-750929, National Technical Information Service, Springfield, Virginia.
- Mattigod, S. V., and A. L. Page. 1983. "Assessment of Metal Pollution in Soils." In *Applied Environmental Geochemistry*, I. Thornton (ed.), pp. 355-394, Academic Press, New York, New York.
- Mattigod, S. V., A. L. Page, and I. Thornton. 1986. "Identification of Some Trace Metal Minerals in a Mine-Waste Contaminated Soil." *Soil Science Society of America Journal*, 50:254-258.

- McBride, M. B. 1980. "Chemisorption of Cd<sup>2+</sup> on Calcite Surfaces." *Soil Science Society of America Journal*, 44:26-28.
- McBride, M. B., L. D. Tyler, and D. A. Hovde. 1981. "Cadmium Adsorption by Soils and Uptake by Plants as Affected by Soil Chemical Properties." *Soil Science Society of America Journal*, 45:739-744.
- McHenry, J. R. 1954. *Adsorption and Retention of Cesium by Soils of the Hanford Project*. HW-S1011, Westinghouse Hanford Company, Richland, Washington.
- McHenry, J. R. 1958. "Ion Exchange Properties of Strontium in a Calcareous Soil." *Soil Science Society of America Proceedings*, 22:514-518.
- McKinley, J. P., J. M. Zachara, S. C. Smith, and G. D. Turner. 1995. "The Influence of Uranyl Hydrolysis and Multiple Site-Binding Reactions on Adsorption of U(VI) to Montmorillonite." *Clays and Clay Minerals*, 43(5):586-598.
- McLean, J. E., and B. E. Bledsoe. 1992. *Behavior of Metals in Soils*. EPA/540/S-92/018, U.S. Environmental Protection Agency, Ada, Oklahoma.
- Meybeck, M. 1982. "Carbon, Nitrogen, and Phosphorous Transport by World Rivers." *American Journal of Science*, 282:401-450.
- Morris, D. E., C. J. Chisholm-Brause, M. E. Barr, S. D. Conradson, and P. G. Eller. 1994. "Optical Spectroscopic Studies of the Sorption of UO<sub>2</sub><sup>2+</sup> Species on a Reference Smectite." *Geochimica et Cosmochimica Acta*, 58:3613-3623.
- Nakashima, S., J. R. Disnar, A. Perruchot, and J. Trichet. 1984. "Experimental Study of Mechanisms of Fixation and Reduction of Uranium by Sedimentary Organic Matter Under Diagenetic or Hydrothermal Conditions." *Geochimica et Cosmochimica Acta*, 48:2321-2329.
- Nakayama, E., T. Kumamoto, S. Tsurubo, and T. Fujinaga. 1981. "Chemical Speciation of Chromium in Sea Water. Part 2. Effects of Manganese Oxides and Reducible Organic Materials on the Redox Processes of Chromium." *Analytica Chimica Acta*, 130:401-404.
- Nash, K., S. Fried, A. M. Friedman, and J. C. Sullivan. 1981. "Redox Behavior, Complexing, and Adsorption of Hexavalent Actinides by Humic Acid and Selected Clays." *Environmental Science and Technology*, 15:834-837.
- Navrot, J., A. Singer, and A. Banin. 1978. "Adsorption of Cadmium and Its Exchange Characteristics in Some Israeli Soils." *Journal of Soil Science*, 29:505-511.

- Nelson, D. M., R. P. Larson, and W. R. Penrose. 1987. "Chemical Speciation of Plutonium in Natural Waters." In *Environmental Research on Actinide Elements*, J. E. Pinder, J. J. Alberts, K. W. McLeod, and R. Gene Schreckhise (eds.), pp. 27-48, CONF-841142 (DE86008713), Office of Scientific and Technical Information, U.S. Department of Energy, Washington, D.C.
- Nelson, D. M., and M. B. Lovett. 1980. "Measurements of the Oxidation State and Concentration of Plutonium in Interstitial Waters in the Irish Sea." In *Impacts of Radionuclide Releases into the Marine Environment*, IAEA Staff (ed.), pp. 105-118, International Atomic Energy Agency (IAEA), Vienna, Austria.
- Nelson D. M., and K. A. Orlandini. 1979. *Identification of Pu(V) in Natural Waters*. ANL-79-65, Argonne National Laboratory, Argonne, Illinois.
- Nielson, K. K., V. C. Rogers, and G. W. Gee. 1984. "Diffusion of Radon Through Soils: A Pore Distribution Model." *Soil Science Society of America Journal*, 48:482-487.
- Nishita, H. 1978. "Extractability of Plutonium-238 and Curium-242 from a Contaminated Soil as a Function of pH and Certain Soil Components. CH<sub>3</sub>COOH-NH<sub>4</sub>OH System." In *Environmental Chemistry and Cycling Process*, pp. 403-416, CONF-760429. Technical Information Center, U.S. Department of Energy, Washington, D.C.
- NRC (U.S. Nuclear Regulatory Commission). 1993. *Site Decommissioning Management Plan*. NUREG-1444, U.S. Nuclear Regulatory Commission, Washington, D.C.
- Nriagu, J. O. 1978. *The Biogeochemistry of Lead in the Environment. Part A. Ecological Cycles*. Elsevier/North-Holland, New York, New York.
- Nriagu, J. O. 1980a. *Cadmium in the Environment - Part 1. Ecological Cycling*. John Wiley and Sons, New York, New York.
- Nriagu, J. O. 1980b. "Production, Uses, and Properties of Cadmium." In *Cadmium in the Environment - Part 1 Ecological Cycling*, J. O. Nriagu (ed.), pp. 35-70, John Wiley and Sons, New York, New York.
- Nriagu, J. O., and P. B. Moore. 1984. *Phosphate Minerals*. Springer-Verlag, New York, New York.
- Nriagu, J. O., and E. Nieboer (eds.). 1988. *Chromium in the Natural and Human Environments, Volume 20*. John Wiley & Sons, New York, New York.
- Oscarson, D. W., and H. B. Hume. 1998. "Effect of Solid:Liquid Ratio on the Sorption of Sr<sup>2+</sup> and Cs<sup>+</sup> on Bentonite." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 277-289, Academic Press, San Diego, California.

- Östhols, E. 1995. "Thorium Sorption on Amorphous Silica." *Geochimica et Cosmochimica Acta*, 59:1235-1249.
- Östhols, E., J. Bruno, and I. Grenthe. 1994. "On the Influence of Carbonate on Mineral Dissolution: III. The Solubility of Microcrystalline ThO<sub>2</sub> in CO<sub>2</sub>-H<sub>2</sub>O Media." *Geochimica et Cosmochimica Acta*, 58:613-623.
- Overstreet, R., and C. Krishnamurthy. 1950. "An Experimental Evaluation of Ion-Exchange Relationships." *Soil Science*, 69:41-50.
- Pabalan, R. T., D. R. Turner, F. P. Bertetti, and J. D. Prikryl. 1998. "Uranium<sup>VI</sup> Sorption onto Selected Mineral Surfaces: Key Geochemical Parameters." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 99-130, Academic Press, San Diego, California.
- Palmer, C. D., and R. W. Puls. 1994. *Natural Attenuation of Hexavalent Chromium in Groundwater and Soils*. EPA/540/S-94/505, U.S. Environmental Protection Agency, Ada, Oklahoma.
- Palmer, C. D. and P. R. Wittbrodt. 1991. "Processes Affecting the Remediation of Chromium-Contaminated Sites." *Environmental Health Perspectives*, 92:25-40.
- Payne, T. E., G. R. Lumpkin, and T. D. Waite. 1998. "Uranium<sup>VI</sup> Adsorption on Model Minerals: Controlling Factors and Surface Complexation Modeling." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 75-97, Academic Press, San Diego, California.
- Peters, R. W., and L. Shem. 1992. "Adsorption/Desorption Characteristics of Lead on Various Types of Soil." *Environmental Progress*, 11:234-240.
- Petruzelli, G., G. Guidi, and L. Lubrano. 1978. "Organic Matter as an Influencing Factor on Copper and Cadmium Adsorption by Soils." *Water Air and Soil Pollution*, 9:263-268.
- Pittwell, L. R. 1974. "Metals Coordinated by Ligands Normally Found in Natural Waters." *Journal of Hydrology*, 21:301-304.
- Prout, W. E. 1958. "Adsorption of Radioactive Wastes by Savannah River Plant Soil." *Soil Science*, 84:13-17.
- Rai, D., A. R. Felmy, D. A. Moore, and M. J. Mason. 1995. "The Solubility of Th(IV) and U(IV) Hydrous Oxides in Concentrated NaHCO<sub>3</sub> and Na<sub>2</sub>CO<sub>3</sub> Solutions." In *Scientific Basis for Nuclear Waste Management XVIII, Part 2*, T. Murakami and R. C. Ewing (eds.), pp. 1143-1150, Materials Research Society Symposium Proceedings, Volume 353, Materials Research Society, Pittsburgh, Pennsylvania

- Rai, D., B. M. Sass, and D. A. Moore. 1987. "Chromium(III) Hydrolysis Constants and Solubility of Chromium(III) Hydroxide." *Inorganic Chemistry*, 26:345-349.
- Rai, D., R. J. Serne, and D. A. Moore. 1980a. "Solubility of Plutonium Compounds and Their Behavior in Soils." *Soil Science Society of America Journal*, 44:490-495.
- Rai D., R. J. Serne, and J. L. Swanson. 1980b. "Solution Species of Plutonium in the Environment." *Journal of Environmental Quality*, 9:417-420.
- Rai, D., and J. M. Zachara. 1984. *Chemical Attenuation Rates, Coefficients, and Constants in Leachate Migration. Volume 1: A Critical Review*. EA-3356, Electric Power Research Institute, Palo Alto, California.
- Rai, D., J. M. Zachara, L. E. Eary, C. C. Ainsworth, J. D. Amonette, C. E. Cowan, R. W. Szelmeczka, C. T. Resch, R. L. Schmidt, S. C. Smith, and D. C. Girvin. 1988. *Chromium Reactions in Geologic Materials*. EPRI-EA-5741, Electric Power Research Institute, Palo Alto, California.
- Rai, D., J. M. Zachara, L. E. Eary, D. C. Girvin, D. A. Moore, C. T. Resch, B. M. Sass, and R. L. Schmidt. 1986. *Geochemical Behavior of Chromium Species*. EPRI-EA-4544. Electric Power Research Institute, Palo Alto, California.
- Rama, and W. S. Moore. 1984. "Mechanism of Transport of U-Th Series Radioisotopes from Solids into Ground Water." *Geochimica et Cosmochimica Acta*, 48:395-399.
- Read, D., T. A. Lawless, R. J. Sims, and K. R. Butter. 1993. "Uranium Migration Through Intact Sandstone Cores." *Journal of Contaminant Hydrology*, 13:277-289.
- Redden, G. D., J. Li, and J. Leckie. 1998. "Adsorption of U<sup>VI</sup> and Citric Acid on Goethite, Gibbsite, and Kaolinite: Comparing Results for Binary and Ternary Systems." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 291-315, Academic Press, San Diego, California.
- Reid, J. C., and B. McDuffie. 1981. "Sorption of Trace Cadmium in Clay Minerals and River Sediments: Effects of pH and Cd(II) Concentrations in a Synthetic River Water Medium." *Water Air and Soil Pollution*, 15:375-386.
- Relyea, J. F. and D. A. Brown. 1978. "Adsorption and Diffusion of Plutonium in Soil." In *Environmental Chemistry and Cycling Process*, CONF-760429, Technical Information Center, U.S. Department of Energy, Washington, D.C.
- Rhoades, J. D. 1996. "Salinity: Electrical Conductivity and Total Dissolved Solids." In *Methods of Soil Analysis, Part 3, Chemical Methods*, J. M. Bigham (ed.), pp. 417-436. Soil Science Society of America, Inc., Madison, Wisconsin.

Rhoads, K., B. N. Bjornstad, R. E. Lewis, S. S. Teel, K. J. Cantrell, R. J. Serne, J. L. Smoot, C. T. Kincaid, and S. K. Wurstner. 1992. *Estimation of the Release and Migration of Lead Through Soils and Groundwater at the Hanford Site 218-E-12B Burial Ground. Volume 1: Final Report.* PNL-8356 Volume 1, Pacific Northwest Laboratory, Richland, Washington.

Rhodehamel, E. C., V. B. Kron, and V. M. Dougherty. 1971. *Bibliography of Tritium Studies Related to Hydrology Through 1966.* Geological Survey Water Supply Paper 1900, U.S. Geological Survey, Washington, D.C.

Rhodes, D. W. 1957. "The Effect of pH on the Uptake of Radioactive Isotopes from Solution by a Soil." *Soil Science Society of America Proceedings*, 21:389-392.

Rhodes, D. W., and J. L. Nelson. 1957. *Disposal of Radioactive Liquid Wastes From the Uranium Recovery Plant.* HW-54721, Westinghouse Hanford Company, Richland, Washington.

Richard, F. C., and A. C. M. Bourg. 1991. "Aqueous Geochemistry of Chromium: A Review." *Water Research*, 25:807-816.

Rickard, D. T., and J. E. Nriagu. 1978. "Aqueous Environmental Chemistry of Lead." In *The Biogeochemistry of Lead in the Environment. Part A. Ecological Cycles.* J. O. Nriagu (ed.), pp. 219-284, Elsevier/North-Holland, New York, New York.

Richards, L. A. 1954. *Diagnosis and Improvement of Saline and Alkali Soils.* Agricultural Handbook 60, U.S. Department of Agriculture, Washington, D.C.

Robbins, J. A. 1978. "Geochemical and Geophysical Applications of Radioactive Lead." In *The Biogeochemistry of Lead in the Environment. Part A. Ecological Cycles,* J. O. Nriagu (ed.), pp. 285-394, Elsevier/North-Holland, New York, New York.

Roberts H., and R. G. Menzel. 1961. "Availability of Exchange and Nonexchangeable Sr-90 to Plants." *Agriculture and Food Chemistry*, 9:95-98.

Rosentreter, J. J., H. S. Quarder, R. W. Smith, and T. McLing. 1998. "Uranium Sorption onto Natural Sands as a Function of Sediment Characteristics and Solution pH." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications,* E. A. Jenne (ed.), pp. 181-192, Academic Press, San Diego, California.

Routson, R. C. 1973. *A Review of Studies on Soil-Waste Relationships on the Hanford Reservation from 1944 to 1967.* BNWL-1464, Pacific Northwest Laboratory, Richland, Washington.

Routson, R. C., G. S. Barney, and R. M. Smith. 1980. *Hanford Site Sorption Studies for the Control of Radioactive Wastes: A Review*. WHO-SA-155, Rev. 1, Rockwell Hanford Operations, Richland, Washington.

RTI (Research Triangle Institute). 1994. *Chemical Properties for Soil Screening Levels*. Prepared for the Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

Ruby, M. V., A. Davis, and A. Nicholson. 1994. "In Situ Formation of Lead Phosphates in Soils as a Method to Immobilize Lead." *Environmental Science and Technology*, 28:646-654.

Ryan, J. L., and D. Rai. 1987. "Thorium(IV) Hydrous Oxide Solubility." *Inorganic Chemistry*, 26:4140-4142.

Sanchez, A. L., J. W. Murray, and T. H. Sibley. 1985. "The Adsorption of Pu(IV) and (V) of Goethite." *Geochimica et Cosmochimica Acta*, 49:2297-2307.

Sandino, A., and J. Bruno. 1992. "The Solubility of  $(\text{UO}_2)_3(\text{PO}_4)_2 \cdot 4\text{H}_2\text{O}(\text{s})$  and the Formation of U(VI) Phosphate Complexes: Their Influence in Uranium Speciation in Natural Waters." *Geochimica et Cosmochimica Acta*, 56:4135-4145.

Santillan-Medrano, J., and J. J. Juriank. 1975. "The Chemistry of Lead and Cadmium in Soil: Solid Phase Formation." *Soil Science Society of America Proceedings*, 39:851-856.

Sass, B. M., and D. Rai. 1987. "Solubility of Amorphous Chromium(III)-Iron(III) Hydroxide Solid Solutions." *Inorganic Chemistry*, 26:2228-2232.

Sax, N. I., and R. J. Lewis, Sr. 1987. *Hawley's Condensed Chemical Dictionary*. Eleventh Edition, Van Nostrand Reinhold Company, New York, New York.

Scheider, K. J., and A. M. Platt (eds.). 1974. *High-Level Waste Management Alternatives. Volume I*. BNWL-1900, pp. 2.D.7-2.D.8, Pacific Northwest National Laboratory, Richland, Washington.

Schulz, R. K. 1965. "Soil Chemistry of Radionuclides." *Health Physics*, 11:1317-1324.

Schultz, R. K., R. Overstreet, and I. Barshad. 1960. "On the Chemistry of Cesium 137." *Soil Science*, 89:16-27.

Schulz, R. K., and H. H. Riedel. 1961. "Effect of Aging on Fixation of Strontium-90 by Soils." *Soil Science*, 91:262-264.

- Schwertmann, U., and R. M. Taylor. 1989. "Iron Oxides." In *Minerals in Soil Environments, Second Edition*. J. B. Dixon and S. B. Week (eds.), pp. 379-438, Soil Science Society of America, Madison, Wisconsin.
- Scrudato, R. J., and E. L. Estes. 1975. "Clay-Lead Sorption Studies." *Environmental Geology*, 1:167-170.
- Serkiz, S. M. And W. H. Johnson. 1994. *Uranium Geochemistry in Soil and Groundwater at the F and H Seepage Basins (U)*. EPD-SGS-94-307, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina.
- Serne, R. J., J. L. Conca, V. L. LeGore, K. J. Cantrell, C. W. Lindenmeier, J. A. Campbell, J. E. Amonette, and M. I. Wood. 1993. *Solid-Waste Leach Characteristics and Contaminant-Sediment Interactions. Volume 1: Batch Leach and Adsorption Tests and Sediment Characterization*. PNL-8889, Volume 1, Pacific Northwest Laboratory, Richland, Washington.
- Serne, R. J. 1977. "Geochemical Distribution of Selected Trace Metals in San Francisco Bay Sediments." In *Biological Implications of Metals in the Environment. Proceedings of the Fifteenth Annual Hanford Life Sciences Symposium at Richland, Washington, September 29-October 1, 1975*. H. Drucker and R. E. Wildung (eds.), pp. 280-296, CONF-75029, Energy Research and Development Administration, Washington, D.C.
- Serne, R. J., and V. L. LeGore. 1996. *Strontium-90 Adsorption-Desorption Properties and Sediment Characterization at the 100 N-Area*. PNL-10899, Pacific Northwest National Laboratory, Richland, Washington.
- Shanbhag, P. M., and G. R. Choppin. 1981. "Binding of Uranyl by Humic Acid." *Journal of Inorganic Nuclear Chemistry*, 43:3369-3372.
- Sheppard, M. I., D. H. Thibault, and J. H. Mitchell. 1987. "Element Leaching and Capillary Rise in Sandy Soil Cores: Experimental Results." *Journal of Environmental Quality*, 16:273-284.
- Silver, G. L. 1983. "Comment on the Behavior of the Chemical Forms of Plutonium in Seawater and Other Aqueous Solutions." *Marine Chemistry*, 12:91-96.
- Simpson, H. J., R. M. Trier, Y. H. Li, R. F. Anderson, and A. L. Herczeg. 1984. *Field Experiment Determinations of Distribution Coefficient of Actinide Elements in Alkaline Lake Environments*. NUREG/CR-3940, prepared for the U.S. Nuclear Regulatory Commission by Columbia University, Palisades, New York.
- Singh, S. S. 1979. "Sorption and Release of Cadmium in Some Canadian Soils." *Canadian Journal of Soil Science*, 59:119-130.

- Singh, B., and G. S. Sekjon. 1977. "Adsorption, Desorption, and Solubility Relationships of Lead and Cadmium in Some Alkaline Soils." *Journal of Soil Science*, 28:271-275.
- Skougstad, M. W., and C. A. Horr. 1963. "Occurrence and Distribution of Strontium in Natural Waters." U.S. Geological Survey Water Supply Paper 1496-D, pp. D55-D97, U.S. Geological Survey, Alexandria, Virginia.
- Smith, J. T., and R. N. J. Comans. 1996. "Modelling the Diffusive Transport and Remobilisation of  $^{137}\text{Cs}$  in Sediments: The Effects of Sorption Kinetics and Reversibility." *Geochimica et Cosmochimica Acta*, 60:995-1004.
- Soldatini, G. F., R. Riffaldi, and R. Levi-Minzi. 1976. "Lead adsorption by Soils." *Water, Air and Soil Pollution*. 6:111-128.
- Sposito, G. 1984. *The Surface Chemistry of Soils*. Oxford University Press, New York, New York.
- Stevenson, F. J., and A. Fitch. 1986. "Chemistry of Complexation Metal Ions with Soil Solution Organics." In *Interactions of Soil Minerals with Natural Organics and Microbes*, P. M. Huang and M. Schnitzer (eds.), SSSA Special Publication No. 17, Soil Science Society of America, Inc., Madison, Wisconsin.
- Stollenwerk, K. G., and D. B. Grove. 1985. "Adsorption and Desorption of Hexavalent Chromium in an Alluvial Aquifer Near Telluride, Colorado." *Journal of Environmental Quality*, 14:150-155.
- Strenge, D. L., and S. R. Peterson. 1989. *Chemical Databases for the Multimedia Environmental Pollutant Assessment System*. PNL-7145, Pacific Northwest Laboratory, Richland, Washington.
- Stumm, W., and J. J. Morgan. 1981. *Aquatic Chemistry. An Introduction Emphasizing Chemical Equilibria in Natural Waters*. John Wiley and Sons, New York, New York.
- Szalay, A. 1964. "Cation Exchange Properties of Humic Acids and their Importance in the Geochemical Enrichment of  $\text{UO}_2^{2+}$  and Other Cations." *Geochimica et Cosmochimica Acta*, 28:1605-1614.
- Tait, C. D., S. A. Ekberg, P. D. Palmer, and D. E. Morris. 1995. *Plutonium Carbonate Speciation Changes as Measured in Dilute Solutions with Photoacoustic Spectroscopy*. LA-12886-MS, Los Alamos National Laboratory, Los Alamos, New Mexico.
- Tamura, T. 1972. "Sorption Phenomena Significant in Radioactive Waste Disposal." In *Underground Waste Management and Environmental Implications*, American Association of Petroleum Geology Memoirs, 18:318-330.

- Tanner, A. B., 1980. "Radon Migration in the Ground: A Supplementary Review." In *Natural Radiation Environment III. Volumes 1 and 2. Proceedings of Symposium Held at Houston, Texas, April 23-28. 1978*, T. F. Gesell and W. M. Lowder (eds.), pp. 5-56, U.S. Department of Energy CONF 780422, National Technical Information Service, Springfield, Virginia.
- Taylor A. W. 1968. "Strontium Retention in Acid Soils of the North Carolina Coastal Plain." *Soil Science*, 106:440-447.
- Ter Haar G. L., R. B. Holtzman, and H. F. Lucas. 1967. "Lead and Lead-210 in Rainwater." *Nature*, 216:353-354.
- Thibault, D. H., M. I. Sheppard, and P. A. Smith. 1990. *A Critical Compilation and Review of Default Soil Solid/Liquid Partition Coefficients,  $K_d$ , for Use in Environmental Assessments*. AECL-10125, Whiteshell Nuclear Research Establishment, Pinawa, Manitoba, Canada.
- Thompson, H. A., G. A. Parks, and G. E. Brown, Jr. 1998. "Structure and Composition of Uranium<sup>VI</sup> Sorption Complexes at the Kaolinite-Water Interface." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 349-370, Academic Press, San Diego, California.
- Ticknor, K. V. 1993. "Actinide Sorption by Fracture-Filling Minerals." *Radiochimica Acta*, 60:33-42.
- Tripathi, V. S. 1984. *Uranium(VI) Transport Modeling: Geochemical Data and Submodels*. Ph.D. Dissertation, Stanford University, Stanford, California.
- Turner, G. D., J. M. Zachara, J. P. McKinley, and S. C. Smith. 1996. "Surface-Charge Properties and  $\text{UO}_2^{2+}$  Adsorption of a Subsurface Smectite." *Geochimica et Cosmochimica Acta*, 60(18):3399-3414.
- UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation). 1982. *Ionizing Radiation: Sources and Biological Effects*. UNIPUB No. E.82.IX.8, 06300P, UNIPUB, New York, New York.
- Van Dalen, A., F. DeWitte, and J. Wikstra. 1975. *Distribution Coefficients for Some Radionuclides Between Saline Water and Clays, Sandstones and Other Samples from Dutch Subsoil*. Report 75-109, Reactor Centrum, Nederland.
- Waite, T. D., J. A. Davis, T. E. Payne, G. A. Waychunas, and N. Xu. 1994. "Uranium(VI) Adsorption to Ferrihydrite: Application of a Surface Complexation Model." *Geochimica et Cosmochimica Acta*, 24:5465-5478.

- Waite, T. D., T. E. Payne, J. A. Davis, and K. Sekine. 1992. Alligators Rivers Analogue Project. Final Report Volume 13. Uranium Sorption. ISBN 0-642-599394 (DOE/HMIP/RR/92/0823, SKI TR 92:20-13).
- Wanner, H., and I. Forest (eds.). 1992. *Chemical Thermodynamics Series, Volume 1: Chemical Thermodynamics of Uranium*. North-Holland, Elsevier Science Publishing Company, Inc., New York, New York.
- Wang, W-Z., M. L. Brusseau, and J. F. Artiola. 1998. "Nonequilibrium and Nonlinear Sorption during Transport of Cadmium, Nickel, and Strontium Through Subsurface Soils." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 427-443, Academic Press, San Diego, California.
- Weast, R. C., and M. J. Astle (eds.). 1980. *CRC Handbook of Chemistry and Physics*. CRC Press, Inc., Boca Raton, Florida.
- Weber, W. J., and H. S. Poselt. 1974. "Equilibrium Models and Precipitation Reactions for Cadmium(II)." In *Chemical Oceanography 2nd Edition*. J. P. Riley and G. Skirrow (eds.), pp. 311-356, Academic Press, New York, New York.
- White, A. F., and M. F. Hochella, Jr. 1989. "Electron Transfer Mechanism Associated with the Surface Dissolution and Oxidation of Magnetite and Ilmenite." In *Water-Rock Interaction WRI-6*, D. L. Miles (ed.), p.765-768. A. A. Balkema, Rotterdam, Holland.
- Wiklander, L. 1964. "Uptake, Adsorption and Leaching of Radiostrontium in a Lysimeter Experiment." *Soil Science*, 97:168-172.
- Yamaguchi, T., Y. Sakamoto, and T. Ohnuki. 1994. "Effect of the Complexation on Solubility of Pu(IV) in Aqueous Carbonate System." *Radiochimica Acta*, 66/67:9-14.
- Yariv, S., and H. Cross. 1979. *Geochemistry of Colloid Systems*. Springer-Verlag, New York, New York.
- Yeh, G., and V. S. Tripathi. 1991. "A Model for Simulating Transport of Reactive Multispecies Components: Model Development and Demonstration." *Water Resources Research*, 27:3075-3094.
- Yong, R. N., and E. M. MacDonald. 1998. "Influence of pH, Metal Concentration, and Soil Component Removal on Retention of Pb and Cu by an Illitic Soil." In *Adsorption of Metals by Geomedia. Variables, Mechanisms, and Model Applications*, E. A. Jenne (ed.), pp. 229-253, Academic Press, San Diego, California.

Zimdahl, R. L., and J. J. Hassett. 1977. "Lead in Soil." In *Lead in the Environment*, W. R. Boggess and B. G. Wixson. (eds.), pp. 93-98, NSF/RA-770214, National Science Foundation, Washington, D.C.